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ABSTRACT

This manual designed for kindergarten and grade 1 is part of a series for a program to integrate the teaching and learning of mathematical and computer concepts and skills in the elementary school. The manual contains 41 lessons. Each lesson includes information on the topic, suggested grade level, mathematics concepts and skills, objective, prerequisite skills needed, and activities. Topics contained in the lessons include: (1) problem solving; (2) geometry; (3) numbers; (4) measurement; (5) number concepts; (6) addition; (7) comparing; (8) estimating; (9) time; and (10) fractions. Software used for the activities is primarily LOGO. (KR)

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Mathematics / Computer Integrated Curriculum K-1

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How can Integrated Computer Curriculum be used in Elementary School (and can I do it?)

by: Michelle Murray-Hurst

Upon entering the last decade of the 20th century-- we are continuing to move forward into the age of technology. Computers of some types have been around since the 1940's and have been used in the school setting since the 1960's. But, are we using the computers effectively and if so, are we integrating them into the regular curriculum? Educators seem to be aware of the need for computer instruction in the middle and upper grades but often it is thought that computers in the lower elementary grades are only for drill, practice, and games. WRONG!! These young children are very interested in computers and are capable of solving some complex problems. Many times students find that grasping concepts is easier using the computer rather than the traditional methods of instruction. Because children are unique and have different learning styles it seems important to provide as many learning opportunities as possible. The computer allows increased methods by providing visual, tactile, and some times auditory responses.

But, let's face the problem, computers are an important part of instruction at all grade levels but the most important fact is to use them on a primary level. Elementary education is the perfect place to begin a strong base of computers because of these students' hunger for knowledge. Mathematics conveniently lends itself to the integration of the computer. It can be done and is being done today. Integration may take a little extra time and effort but the rewards could be bountiful. The mathematics

curriculum is relatively simple and all of the objectives may be taught or enriched by using the computer.

Now is the time that educators realize that computers are our friends and want to make our lives easier. It is our responsibility to allow our children to grow up with computer knowledge and not be afraid to experience new technological advances.

Integration of computers into the curriculum is here today and is something that can be easily expanded through ingenuity and creativity. Many curriculum documents to assist teachers in making this transition have been developed. This document was designed for kindergarten through sixth grade and the lessons can be presented by teachers with very little computer experience. So we recognize that integration can be easily done.

TURTLES INVADE THE CLASSROOM !!!

Molly Kniffen

Computers, computers, everywhere----even in a kindergarten classroom!! What will they think of next? What do I do with a room full of five-year olds just itching to get their little hands on that expensive machine? Five-year olds can't program a computer? Why, they can't even read!

These are all questions or feelings teachers have or have heard expressed by others. The actual problem isn't whether or not five-year olds are capable of programming a computer. The actual problem is that kindergarten teachers, have a fear of computers and of programming those machines.

Most anyone can program a computer to some extent. You don't necessarily have to be able to "read" to program a computer. Take for example what happened the day the turtles invaded the classroom.

Everything was running along smoothly in our classroom when suddenly we received word that our school was being invaded by enemy turtles. The children became very excited and agreed to help keep a watch out for these unwelcome visitors.

After several group discussions on what an enemy was, the children had reached the conclusion that they did not want this type of person in our classroom. We had decided that enemy turtles would surely want to fight in order to take control of our classroom. This was terrible because after all, fighting was definetely against the school rules! As the day progressed, the children kept a very close watch for the invaders but to our relief, no turtles appeared.

When the children arrived the next morning, we were told that one turtle had been seen in our school building earlier that morning. We were

also told that these turtles were not the type of animals we were used to seeing and catching at the pond or lake. These turtles had changed their shape to have three straight sides that connected and three angles or corners where their sides joined. Since the children were studying shapes, it did not take long for them to design a turtle in the shape of a triangle. We still felt fairly safe, however, because we usually kept our door closed and we felt no turtle could get into our classroom through a closed door. But, just to be safe, we decided to build a cage. After all, we might have to help some other teacher capture an enemy invader even if the turtle didn't wander into our classroom.

As the children returned from P.E. that day, they found our room in complete chaos. The turtle had invaded!! We had to have a plan and quick. Everyone agreed that since the turtle was an enemy , if we should find one in our class, only the teacher should try to pick the turtle up. After all, what if the turtle really was mean. The turtle might try to bite us!!

After a short search, the turtle was spotted and was soon in captivity! We were safe again. What a relief!

Now we were faced with a new problem. What do you do with an enemy turtle? Even though the turtle looked friendly enough, how could we be sure? We finally decided to keep the turtle as a pet and try to teach him proper school behavior.

Since the children were studying shapes in mathematics, we decided to start by teaching the turtle about shapes. The children already had a basic understanding of the properties of the square, the rectangle, the triangle, and the circle.

When we took the turtle out of the box and placed him on the floor, he would not move. He just laid there. We tried everything to make the turtle move. We stomped our feet, we clapped our hands, we called the turtle, but nothing worked. The turtle simply would not move. We finally decided to choose a student to hold the turtle and make the turtle walk. This had

to be a very brave person. Being very careful to point the turtle's head away from our bodies (just in case the turtle got mad and decided to bite), we would walk as directed to help the turtle form a square on the floor. For example, we would instruct the turtle to go forward three steps, turn left, go forward three steps, turn left, go forward three steps, turn left, and go forward three steps. The children again reviewed the fact that squares had four corners and four sides. We were reminded that all of the sides were exactly the same length. After several minutes of practice of helping the turtle make different size squares on the floor, we noticed that the turtle looked a little tired and maybe even a little sad. We decided this was a good time to return the turtle to the cage for a rest.

The next morning when the children came into the classroom, we had a new machine in our class. A computer!!! The children could hardly wait to get their hands on the computer. After a discussion on the care and proper way to treat the new equipment, we loaded the computer with the EZ Logo software package by MECC. This software package is designed for use in the lower elementary classrooms.

Suddenly a strange thing happened!! There in the middle of our computer screen was a creature that looked a lot like the turtle we had captured in our classroom. Upon checking the turtle box, we discovered that our turtle had escaped! The turtle had gotten into our computer!

What now? How were we to get the turtle out of the new computer? The turtle certainly looked happy enough. Why we even thought the turtle was smiling. We decided to let the turtle live in our computer. The turtle seemed to really like his new home.

The children then discussed how they could make the turtle inside the computer move. After all, the turtle would need some exercise! The children discovered that by pressing certain keys on the keyboard, they could make the turtle walk. To make the turtle walk forward, we pressed the F . To make the turtle walk backward, we pressed the B. To make the

turtle turn left, we pressed the L. To make the turtle turn right, we pressed the R.

The children were then challenged to see if they could make the turtle in the computer draw a square on the computer screen. They were reminded that all of the sides had to be the same length and that the square had to have four corners or angles.

It was amazing!!! With a basic understanding of shapes and a limited understanding of computers, the children were able to draw shapes. With a little extra help and guidance, the children could make rectangles, triangles, and even circles. A little additional instruction and a lot of experimentation and the children were able to combine shapes to make original pictures!

The five-year olds had suddenly become computer programmers! The children still didn't know how to read but they had experienced success on the computer. All they had needed was excitement and a willingness to try.

All of the children had experienced some degree of success from the invasion of the turtles regardless of their learning abilities. The gifted students were challenged, the at risk students felt success, and everyone had fun.

If a five-year old can program a computer, so can we. Regardless of our educational background and past experiences, we can learn to work with computers too. All we really need is a willingness to try.

So come on kindergarten teachers, get with the program!! Give it a try. Who knows, maybe we are really all computer programmers in disquise.

Pre Computer Lesson #K-1-1

Topic: PROBLEM SOLVING

Suggested Grade Level: K-1

Mathematical Essential Element: 03 Experience in solving problems by selecting and matching strategies to given situations.

Descriptor: 0301- Experience at the readiness level: oral problem solving with objects.

Objective: 030101 Use objects to aide in oral problem solving.

Content Description: Students will be able to direct turtle by using non-verbal directions.

Prerequisite Skills: Forward and Back commands.

Activities: Step 1: Tell students that spies have invaded the class so we must develop a way of directing turtle without talking.

Step 2: Develop "secret codes" for control of turtle. F= Forward B= Back

Step 3: Extend to include the number of steps turtle should take. Make turtle move without talking by use of flash cards. Students should work in pairs.

Step 4: Return turtle home as lesson ends.

Instructional Resources: Neufeld, RV (1986) Learning Math With Logo

Computer Lesson #K-1-2

Topic: CIRCLE

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0501 Experience at the readiness level: classification.

Objective: 050102 Match identical shapes of circles, squares, rectangles, and triangles.

Content Description: Create the shape of a circle when one is provided.

Prerequisite Student Skills: Knowledge of EZ LOGO commands. Know the properties of a circle.

Activites:

Step 1: PU, Return, Move turtle to left side of screen., PD, Return, Provide circle on screen by following Step 2.

Step 2: The student will create his own circle.

F

R

F

R

F

R

F

R

F

R

F

R

F

R

F

R

F

R

F

R

F

R

F

R

Step 3: Allow time for the student to create a circle of a different size.

Instructional Resource: LOGO

Learning Math with LOGO, Neufeld

Computer Lesson # K-I-3

Topic: GEOMETRY

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0502 Experience at the readiness level: size and shape.

Objective: 050201 Identify and name the shape of two dimensional figures; circle, square, rectangle, and triangle.

Content Description: Making circles

Prerequisite Student Skills: Logo Commands

Activities: The students will draw the Three Bears using circle shapes or other designs using circle shapes.

To make circle: R-right
F-forward
R-right
F-forward
R-right
F-forward
R-right
F-forward
R-right
F-forward

Instructional Resource: EZ LOGO

Computer Lesson #K-1-4

Topic: .SQUARE

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0501 Experience at the readiness level: Classification.

Objective: 050102 Match identical shapes of circles, rectangles, squares, and triangles.

Content Description: Create the shape of a square when one is provided.

Prerequisite Student Skills: Knowledge of EZ LOGO Commands. Know the properties of a square.

Activities: Step I: PU Return; Move Turtle to left side of screen. PD Return; Provide square on screen by following Step 2.

Step 2: The student will create his on square.

F
F
F
F
F
R
R
R
F
F
F

F
F
R
R
R
F
F
F
F
F
F
R
R
R
F
F
F
F
F

STEP 3: Allow time for student to create a square of a different size.

Instructional Resource: Learning Math with Logo, Neufeld

Computer Lesson #K-I-5

Topic: GEOMETRY

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationship of geometric shapes and their application.

Descriptor: 0502 Experience at the readiness level: size and shape.

Objective: 050201 Identify and name the shape of two-dimensional figures: circle, square, rectangle, and triangle.

Content Description: Making squares

Prerequisite Student Skills: Computer Logo, counting, lines, left and right

Activities:

Make squares all over the screen. Line them up, stack 'em up and do all kinds of things. (Ex. windows, sidewalks, or flags)

To make square: F - four spaces
R - right turn
F - four spaces
R - right turn
F - four spaces
R - right turn
F - four spaces

Use PU (pen up) to move turtle. To make other squares on page use PD(pen down)

Instructional Resource: EZ LOGO, Apple IIe, 123 My Computer and Me p.

31,32,33

Computer Lesson #K-1-6

Topic: RECTANGLE

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0501 Experiences at the Readiness level: classification.

Objective: 050102 Match identical shapes of circles,squares,rectangles and triangles.

Content Description: Create the shape of a rectangle when one is provided.

Prerequisite Student Skills: Knowledge of EZ LOGO commands. Know the properties of a rectangle.

Activities: Step 1 : PU Return - Move turtle to the left side of screen. PD Return . Provide a rectangle on the screen by following Step 2.

Step 2 : The student will create his own rectangle.

F
F
F
F
F
R
R
R
F
F
F

F
F
F
F
F
F
F
R
R
R
F
F
F
F
F
F
R
R
R
F
F
F
F
F
F
F
F
F
F
F

Step 3: Allow time for students to create a rectangle of a different size.

Instructional Resource: Learning Math With LOGO, Neufield

Computer Lesson #K-1-7

Topic: GEOMETRY

Suggested Grade Level: K-1

Mathematical Essential Element: 05 properties and relationships of geometric shapes and their applications .

Descriptor: 0502 Experience at the readiness level: size and shape. (1st grade/ new element 6.3)

Objective: 050201 Identify and name the shape of two dimensional figures: circle, square, rectangle, and triangle.

Content Description: Rectangle designs

Prerequisite Student Skills: LOGO commands, counting

Activities: The students have been selected to design a flag for their school or classroom . They are to use only rectangle shapes for this project.

To make rectangle: F-five spaces

R-right turn

F-ten spaces

R- right turn

F- five spaces

R- right turn

F- ten spaces

To decorate flag- PU should be used to move turtle inside flag. PD should be used to draw design inside flag.

Instructional Resource: E Z LOGO

Computer Lesson #K-I-8

Topic: GEOMETRY SHAPES

Suggested Grade Level: K-1

Mathematical Essential Element: Enrichment

Descriptor: 6.2

Objective: Combining shapes to make new shapes.

Content Description: Putting shapes together.

Prerequisite Student Skills: Logo commands, left, right, up, down

Activities:

Let student draw different scenes from shapes using the Logo commands (ex. house, flowers, trees, etc.).

Instructional Resource: EZ LOGO

Computer Lesson #K-1-9

Topic: IDENTIFYING TWO-DIMENSIONAL SHAPES

Suggested Grade Level: K-1

Mathematical Essential Element: 6.3 (new element)

Descriptor:

Objective: Identifying two dimensional shapes.

Content Description:

Prerequisite Student Skills: Be familiar with computer. Know LOGO commands.

Activities: Make a diamond and a rectangle.

CREATE A DIAMOND

Step 1: TO TRIANGLE (Return)

REPEAT 2 (FD 50 RT 120)

END

CTRL C (computer asks for Triangle defined type TRIANGLE and proceed to Step 2)

Step 2: LT 60

TRIANGLE

CREATE A RECTANGLE

Step 1: TO SQUARE

REPEAT 3 (FD 50 RT 90)

END

CTRL C (computer will ask for square defined, type SQUARE and

preceed to Step 2.)

Step 2: LT 90

SQUARE

Instructional Resource: LOGO

Learning Math with LOGO

Computer Lesson #K-1-10

Topic: COMBINING SHAPES TO FORM NEW SHAPES

Suggested Grade Level: K-1

Mathematical Essential Element: 6.2 (new element)

Descriptor:

Objective: To combine shapes to make new shapes.

Content Description: Use shapes to create a new shape.

Prerequisite Student Skills: Be familiar with computer. Know LOGO commands : FD, RT, LT, PU, PD, HOME, CS, CTRL-C, RETURN

Activities: MAKE TURTLE A HOUSE

Step 1: On chalkboard, demonstrate the shapes used to make a simple house (square, rectangle, triangle).

Step 2: Review LOGO commands.

Step 3: Students compute: TO SQUARE (Return), REPEAT 4 [FD 50 RT 90] (Return), END, CTRL-C, (computer asks for square defined), SQUARE (RETURN)

Step 4: TO TRIANGLE, REPEAT 3[FD 50 RT 120], END, CTRL-C, TRIANGLE,(Return)

Step 5: TO HOUSE, SQUARE,FD 50 RT 30, TRIANGLE, END, CTRL-C, HOUSE,(Return)

Step 6: After the house appears type: PU (Return) HOME (Return) RT 90 (Return) FD 20 (Return) LT 90 (Return) PD (Return) FD 20 (Return) RT 90 (Return) FD 10 (Return) RT 90 (Return) FD 20 (Return)

Instructional Resource: Learning Math with LOGO

Computer Lesson #K-1-11

Topic: PROBLEM SOLVING

Suggested Grade Level: K-1

Mathematical Essential Element: 03 Experience in solving problems by selecting and matching strategies to given situations.

Descriptor: 0302 Experience at readiness level: identifying patterns.

Objective: 030202 Design an original pattern that has repetition.

Content Description: Identifying and designing patterns

Prerequisite Student Skills: Understanding of E Z LOGO language and experience with circles and squares. Knowledge of patterns.

Activities: Step 1: Review basic LOGO for designing a square.

F 4
R 4
R 4
R 4

Step 2: Review basic LOGO for designing a circle.

R 1
F 1
R 1
F 1
R 1
F 1
R 1
F 1
etc.

Step 3: Clear screen and let children design an original pattern using circles and squares.

Step 4: Clear screen and have a contest for the most unusual pattern using circles and squares.

Instructional Resource: LOGO

Learning Math with LOGO, Neufeld

Computer Lesson #K-1-12

Topic: NUMBER RECOGNITION

Suggested Grade Level: K-1

Mathematical Essential Element: 01 Concepts and sills associated with the understanding of numbers (whole , integers, and non-negative, rational and place value.)

Descriptor: 0103 Experience at the readiness level: ordering.

Objective: 010301 Orders numbers (0-10) from the one with the greatest value to the one with the least value and from the one with the least value to the one with the greatest value.

Content Description: The students will identify numbers from clues using the number line and directions of greater than and less than.

Prerequisite Student Skills: Knowledge of number line; recognition of numbers 0-5.

Activities: Step 1: Students type in names to identify players.

Step 2: Take alternate turns guessing which number is hidden on the number line.

Step 3: If response is incorrect; student is directed to locate Larger number or Smaller number.

Step 4: When correct response is selected music plays and tone beeps to auditorially reinforce number.

Step 5: Students strive to select correct number in 3 tries or less.

Instructional Resource: LOGO

Perl, Ter; Bumble Games,

The Learning Company, pp. T12-T13.

Computer Lesson #K-1-13

Topic: COUNTING OBJECTS

Suggested Grade Level: K-1

Mathematical Essential Element: 01 Concepts and skills associated with the understanding numbers and the place value system.

Descriptor: 0104 Experience at the readiness level: Counting objects.

Objective: 010401 Count objects in a set one to one.

Content Description: Draw and count objects on the screen (1-5).

Prerequisite Student Skills: Knowledge of EZ LOGO commands. Knowledge to construct geometric shapes.

Activites: Step 1: The learner will construct any number of geometric shapes on the computer screen.

SQUARE	RECTANGLE	CIRCLE
F	F	F
F	F	R
F	R	F
R	R	R
R	R	F
R	F	R
F	F	F
F	F	R
F	F	F
R	R	R
R	R	F
R	R	R

F	F	F
F	F	R
F	R	F
R	R	R
R	R	F
R	F	R
F	F	F
F	F	R
F	F	F
		R
		F
		R

Step 2: The learner will count the number of geometric shapes on the computer screen.

Step 3: Repeat steps 1 and 2.

Instructional Resource: LOGO

Computer Lesson #K-1-14

Topic: PATTERNS

Suggested Grade Level: K-1

Mathematical Essential Element: 03 Experience in solving problems by showing matching strategies to given situations.

Descriptor: 0302 Experience at the readiness level: identifying patterns.

Objective: 030201 Complete a pattern by copying a given pattern.

Content Description: Recreate the pattern shown. Create your own pattern with circles and squares.

Prerequisite Student Skills: Knowledge of EZ LOGO commands. Know the geometric properties of a circle and square. Understand the concept of patterns.

Activities: Step 1: Press PU then Return and move the turtle thirteen F's to the left , then three R's, five F's , PD, then Return.

Step 2: Provide a simple pattern (A,B) on the screen.(see step 3)

Step 3: The student will complete the pattern given.

a) F
F
F
R
R
R
F

b) F
R
F
R
F
R
F

F	R
F	F
R	R
R	F
R	R
F	F
F	R
F	F
R	R
R	F
R	R
PU	F
RETURN	R
The turtle will move	F
PD	R
RETURN	F
	R
	PU
	RETURN
	The turtle will move
	PD
	RETURN

c) Repeat a and b to complete the pattern.

Instructional Resource: Learning Math with LOGO

Computer Lesson #K-1-15

Topic: PATTERNS

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0503 Experience at the readiness level: patterns.

Objective: 050301 Solve a problem using geometric patterns.

Content Description: Create a picture with a pattern.

Prerequisite Student Skills: Knowledge of EZ Logo commands and geometric properties of the shapes. Also, understand the concept of patterns.

Activities:

1. Review EZ Logo commands.
2. TLW create a picture by using geometric shapes in a pattern

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Instructional Resource: Learning Math With Logo

Pre Computer Lesson #K-1-16

Topic: COMPARING

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0401 Experience at the readiness level:comparing

Objective: 040104 Identify and construct sets that have one or more or one less member.

Content Description: Turtle Aerobics

MATERIALS: Word cards with GO and RETURN (A string is attached so students can wear around neck.)

Prerequisite Student Skills: Know directional words left and right, listening skills and positional words.

Activities: Teacher pretends to be a computer and students are the LOGO turtle. The student wearing RETURN card will stand next to teacher and also hold the GO card. At a touch from teacher the student will hold up the GO card as a signal for the rest of the students to implement the commands that the teacher has already given. The turtle won't carry out the commands until the RETURN has been touched. Having given `directions, the teacher proceeds to command : "Forward two steps". "Forward four giant steps". "BACK (not backwards) two baby steps", etc. This game is a version of "Mother May I".

Instructional Resource: EZ LOGO Apple Computer; The Computing Teacher Aug./Sept. 1989 p. 38

Pre-Computer Lesson #K-1-17

Topic: LOCATE NUMBERS ON A NUMBER LINE

Suggested Grade Level: K-1

Mathematical Essential Element: 06 The representation of numbers on a line and pairs of numbers on a coordinate plane.

Descriptor: 0602 Locate points on a number line.

Objective: 060202 Locate points on a number line using whole numbers to 20.

Content Description: Students will walk on a number line (0-20) when given one step directions.

Prerequisite Student Skills: Recognition of numbers 0-20. Rote count 0-20.

Follow one step directions.

Activities: FEED THE TURTLE

Materials needed: A number line 0-20 affixed to floor on which students can walk; a cardboard turtle * for the student playing the Turtle to hold to indicate direction the student is facing; 10-20 blank cards with a fish drawn on one; a portable slate with chalk.

The object is to direct students (Turtle) to the Turtle food (fish card). One student is chosen as turtle , others sit around the number line in a circle. Teacher places cards face down on number line. (Turtle does not see where fish card is placed). The Turtle stands in the turtle box at 0 on the number line. Different students are chosen to give directions for reaching the number where they think Turtle food is hidden. (The student is commander.) Only LOGO like commands are accepted (e.g., FD (forward) 3 to reach number three on number line, then FD 5 to reach number eight).

The commands are verbalized "FD space three" or "FD space five". Teacher prints on portable slate FD_3, FD_5 (This helps students see that _ represents space bar on computer. If the commander forgets to say "space" he loses his turn. The game ends when turtle successfully lands on number with Turtle food.

Instructional Resource: The Computing Teacher Aug./Sept. 89 p. 30

* The turtle should be in the shape of a triangle about 8 inches long.

Pre Computer Lesson #K-1-18

Topic: NUMBER and NUMERATION

Suggested Grade Level: K-1

Mathematical Essential Element: 01 Concepts and skills associated with the understanding of numbers (whole integer, non-negative rational) and the place value.

Descriptor: 0101 Experience at readiness level: number concepts.

Objective: 010102 Using numbers 0-5; introduction to the number line.

Content Description: The students will develop understanding of the number line and participate in low organizational games.

Prerequisite Student Skills: Recognition of the numbers 0-5.

Activities: Step 1: Players shuffle cards and place face down.

Step 2: Alternate turns selecting a card and recording number of spaces on the number line.

Step 3: Each play the player may move number indicated on the card or choose to pass. Place used card in discard pile.

Step 4: Players alternate turns until one player reaches the end of the line. Must draw exact number at end of the game.

Step 5: If no winner is reached before all cards are used, the discard pile is reshuffled and play continues.

MATERIALS NEEDED:

A set of number cards (1-5), number line for each player (p. 6)and crayons.

Instructional Resource: LOGO

Perl, Teri, Bumble Games, The Learning Company, pp. T15-T16 and 4-6

Computer Lesson # K-1-19

Topic: SPATIAL AWARENESS

Suggested Grade Level: K-1

Mathematical Essential Element: 7.3 (new element)

Descriptor:

Objective: Drawing conclusions from graphed data.

Content Description: Using the concept of ordered pairs gaining spatial awareness.

Prerequisite Student Skills: Following directions and left/right directions

Activities: Step 1: Boot computer to (3) Butterfly Hunt.

Step 2:
* Typing a letter highlights a column of boxes.
* Typing a number highlights a row of boxes.
* The chosen box where the row and column cross is highlighted.
* The chosen box changes if the butterfly is not there.
* Word clues point the way to the butterfly's box.
* The butterfly appears when the correct box is chosen.

Step 3: * Students will choose possible boxes, by naming the column and row.

Instructional Resource: Bumble Games, The Learning Co. (For additional information see Bumble Games TE p. 23)

Pre-Computer Lesson #K-1-20

Topic: NUMBER AND NUMERATION

Suggested Grade Level: K-1

Mathematical Essential Element: 1.1

Descriptor:

Objective: USING AN ARRAY. locating a box by identifying its horizontal and vertical location

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Content Description: To reinforce the concept of columns and rows. To help students follow the word.

Prerequisite Student Skills: Right and left

Activities: FIND ME

Materials - One activity sheet (p.11) for each student. Crayons, pencils or pens for students to color the sheets.

Step 1: Pick an object- ask student to name the column or row that it is in. Students then color the object.

Step 2: Repeat the activity naming the column or row of other objects until the page is finished.

*Be sure to use word clues to help students learn to follow directions.

Instructional Resource: Bumble Games - The Learning Company TE p.20

Pre-Computer Lesson #K-1-21

Topic: POSITIONAL AND COMPARISON RELATIONSHIPS

Suggested Grade Level: K-1

Mathematical Essential Element: 06 Show positional and comparison relationships.

Descriptor: 0602 Locate points on a number line.

Objective: 060201 Indicate specified positions (up, down, below, backward, forward, left, and right.)

Content Description: Student will move to different positions using first a floor grid, then a paper grid, and finally the computer. Positional words included are left, right, forward, backward.

Prerequisite Student Skills: To follow simple one step oral directions.

Activities:THE TURTLE WEARS A DIAMOND

Step 1: Children pretend to be turtles coming to town. The goal is to walk on streets (10' X 10' floor grid made from colored plastic tape) to an object such as a toy building placed at a given intersection. The turtle begins trip from lower left corner. Give children rings made of pipe cleaners and felt and mark with Lor R. A green ring with L goes on left hand and red ring with R on right. The right ring has a silver glitter dot. (The turtle wears a diamond) Students record procedures on small chalkboards using L and R and Ffor forward.

Step 2: Move small felt turtle with green left foot and red right foot on a paper grid which simulates floor model. Small rubber stamps are used to mark designations on the paper grid. Students record turtle's trip in the margin of the paper.

Step 3: Children move gradually into use of computer where a grid of similar design is placed on screen. They continue wearing rings while working on computers.

Instructional Resource: The Computing Teacher Volume 13 #2 10/85

Computer Lesson #K-1-22

Topic: COUNTING OBJECTS IN A SET

Suggested Grade Level: K-1

Mathematical Essential Element: 01 Concepts and skills associated with the understanding of numbers (whole, integer, and non-negative rational) and the place value system.

Descriptor: 0101 Experience at the readiness level: number concepts.

Objective: 010107 Construct sets with a given number of objects, (0-5).

Content Description : Count the number of times each letter is pressed to cause the Turtle to move around completely.

Prerequisite Student Skills: Understands number concepts. Can rote count and knows what the turtle is.

Activites: THE SKATEBOARD

Step 1: Move the turtle about the screen.

Step 2: Press D F F F

Press R again and again and again....

How many R's are needed to turn the turtle around completely?

Step 3: Repeat Step 2 with the L key. How many L's are needed to turn the turtle around completely?

Instructional Resource: LOGO

Learning Math with LOGO Student Text p. 2-3

Computer Lesson #K-I-23

Topic: NUMBERS

Suggested Grade Level: K-1

Mathematical Essential Element: 0I Concepts and skills associated with the understanding of numbers (whole, integer, and non-negative rational numbers) and the place value system.

Descriptor: 0101 Experience at readiness level : number concept

Objective: 010108 Identify and name numerals (0-10).

Content Description: Tracing numbers

Prerequisite Student Skills: LOGO commands

Activities: Using a transparency to outline numbers from 0-10, the students will use the LOGO turtle to trace around each number.

Directions: Outline numbers from 0-10, on a transparency.

Place transparency over computer screen. Press PU (pen up) Move the turtle to the first number. Press PD (pen down) to trace around numbers. Continue this procedure until all numbers have been traced.

Instructional Resource: EZ LOGO

Computer Lesson #K-1-24

Topic: NUMBER AND NUMERATION

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0401 Experience at the readiness level: comparing.

Objective: 040103 Name the sets having one more member or one less member than another.

Content Description: The students will use problem solving skills to determine a secret number on the number line by using greater than and less than.

Prerequisite Student Skills: Knowledge of words greater and less than.

Activites: Step 1: Boot computer to (1) Find your number.

Step 2: Explain the following points:

* A guess is made by pressing the number keys from 0-5 on the keyboard.
* A box appears above the number guessed.
* The box flashes when the guess is right.
* An arrow appears when the guess is not right. The arrow points in the direction of Bumble's special number.

Step 3: Allow students to begin. (For additional information see Bumble Games p. T12-T13)

Instructional Resource: LOGO Bumble Games, The Learning Company

Computer Lesson #K-1-25

Topic: NUMBER AND NUMERATION

Suggested Grade Level: K-1

Mathematical Essential Element: 1.1 Using a 4 x 4 array

Descriptor:

Objective: Locating a box by identifying its horizontal and vertical location. Using concept of ordered pair.

Content Description: Find a secret location of Bumble's hiding place on a 4 x 4 array.

Prerequisite Student Skills: Know left, right, up, down. Be familiar with computer. Know alphabet and numbers 0-20.

Activites: FIND THE BUMBLE

Step 1: Introduce column and row. (Repeat this rhyme to help, "A column climbs up like a flying kite, and row runs across left to right".) Explain that an array is an orderly arrangement of boxes or other objects. (You may choose to do Find Me activity).

Step 2: Load program. Menu appears. Student presses 2 to load "Find the Bumble Bee". The screen displays an array (4x4 - 16 boxes) Letters A B C D identify columns and numbers 0-3 identify rows.

Step 3: Explain to students that Bumble is hiding inside one of the boxes. It's up to the student to find the Bumble. Word and arrow clues point the way to Bumble's box. Bumble appears when correct box is chosen.

Step 4: When the game is finished the question ,"Do you want to hunt again?" appears. Press Y for yes- array will reappear but Bumble is in a

different hiding place. Press N for no. Program returns to main menu.

Instructional Resource: Bumble Games, The Learning Co. , Teacher Edition p. 19

Computer Lesson #K-1-26

Topic: ADD WHOLE NUMBERS

Suggested Grade Level: K-1

Mathematical Essential Element: 2B (new element)

Descriptor: Add whole numbers

Objective: To have students add whole numbers.

Content Description: Construct a simple number line and add whole numbers by pressing simple key "Instant" (forward) commands on the computer.

Prerequisite Student Skills: Knowledge and recognition of numbers.

Activities: Use LOGO to construct simple number line.

Add whole numbers (1-10) to the number "1" (starting position)

Ex. F1 = 2

F3 = 4

F4 = 5

F5 = 6

F6 = 7

F7 = 8

F8 = 9

F9 = 10 Students may alter numbers in line.

Instructional Resource: LOGO

Pre-Computer Lesson #K-1-27

Topic: ADDING WHOLE NUMBERS

Suggested Grade Level: K-1

Mathematical Essential Element: 02 The basic operations on numbers (addition, subtraction, multiplication, and division) their properties, and their uses.

Descriptor: 0201 Experience at the readiness level: physical representations of addition and subtraction.

Objective: 020101 Construct a set using two sets to describe the operation of addition.

Content Description: one more, two more

Prerequisite Student Skills: Taking turns, face value of coins (head and tails)

Activities: This activity is a race to the end of the shape or number line.

MATERIALS: one coin for two players
crayons
shapeline (blackline master)

TO PLAY: Players take turns flipping the coin. Heads means color one step to the right. Tails means do nothing. The player to color or mark the last shape or number on the line wins.

Instructional Resource: LOGO

The Learning Company, Bumble Games, p. 1 Activity sheets

Pre-Computer Lesson #K-1-28

Topic: PROBLEM SOLVING

Suggested Grade Level: K-1

Mathematical Essential Element: 03 Experience in solving problems by selecting and matching strategies to given situations.

Descriptor: 0301 Experience at the readiness level: oral problem solving with objects.

Objective: 030101 Use objects to aide in oral problem solving.

Content Description: Students will be able to direct "Turtle" using verbal directions.

Prerequisite Student Skills: EZ LOGO commands

Activites: Step 1: Introduce story of class being invaded or attacked by enemy turtles. The job of the children is to capture and control the enemy. Explain to the scouts say, " The "Turtle" has 3 sides and is rather slow."

Step 2: Discuss what "Turtle" looks like and set trap to capture. Let children create their own "Turtles".

Step 3: After capture of "Turtle", discuss characteristics and let children describe turtle and discuss head (shaded part).

Step 4: Tell children he only moves when told or made to move. Guide children to notice he moves direction head is pointed. Practice forward and back. (F and B)

Step 5: Let children practice moving turtle as directed by teacher and peers.

Instructional Resource: LOGO

Learning Math with LOGO, Neufeld 1986. p. 1-6

Pre Computer Lesson #K-1-29

Topic: COMPARING

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0401 Experience at the readiness level:comparing

Objective: 040104 Identify and construct sets that have one or more or one less member.

Content Description: Turtle Aerobics

MATERIALS: Word cards with GO and RETURN (A string is attached so students can wear around neck.)

Prerequisite Student Skills: Know directional words left and right, listening skills and positional words.

Activities: Teacher pretends to be a computer and students are the LOGO turtle. The student wearing RETURN card will stand next to teacher and also hold the GO card. At a touch from teacher the student will hold up the GO card as a signal for the rest of the students to implement the commands that the teacher has already given. The turtle won't carry out the commands until the RETURN has been touched. Having given `directions, the teacher proceeds to command : "Forward two steps". "Forward four giant steps". "BACK (not backwards) two baby steps", etc. This game is a version of "Mother May I".

Instructional Resource: EZ LOGO Apple Computer; The Computing Teacher Aug./Sept. 1989 p. 38

Computer Lesson #K-1-30

Topic: MEASUREMENT

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0401 Experience at readiness level: comparing.

Objective: 040101 Compare relative sizes of objects.

Content Description: Students will design different sized chairs from the story THE THREE BEARS.

Prerequisite Student Skills: Knowledge of left and right; forward and back; EZ LOGO.

Activites: Step 1: After reading and discussing story of The Three Bears have students design Papa Bear's chair. Let students practice on their own and then guide :

F 10
B 5
R 3
R 5
PU (move turtle and design Mama's chair)
PD
F 8
B 4
R 2
R 4

PU (move turtle to make Baby's chair)

PD

F 6

B 3

R 1

R 3

Discuss chairs largest to smallest. Let children practice making beds in same order largest to smallest.

Step 2: Extend lesson by letting them make original objects starting from largest to smallest using 3 objects. Let other students check to see if designs go from largest to smallest.

Instructional Resource: LOGO

Book: The Three Bears

Pre-Computer Lesson #K-1-31

Topic: MEASUREMENT, ESTIMATION, COMPARING

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0401 Experience at the readiness level: comparing.

Objective: 040102 Order objects according to length.

Content Description: The students will develp understanding of measurement through estimation and actual use of measurement .tools.

Prerequisite Student Skills: Use of a ruler

Activities: MEASURE ME

Step 1: Pick object in room and estimate length or height. Let students measure to see how close.

Step 2: Discuss why the estimation is bigger/smaller than actual measure. Young children might use unifix cubes, books, feet, hands, etc. instead of rulers.

Step 3: Activity sheet with Bumble (p.9). Let children measure and color. Use centimeters and inches and discuss relationship.

MATERIALS NEEDED:

Activity sheet #9, ruler, scissors, crayons

Instructional Resource: LOGO

Perl, Teri, Bumble Games, The Learning Company, pp. 9 and T17

Computer Lesson #K-1-32

Topic: TIME

Suggested Grade Level: K-1

Mathematical Essential Element: 5.6

Descriptor: Concepts and skills using measurement

Objective: Exploring the concept of time in terms of what can be done in one minute.

Content Description: The student will be able to reconstruct times on a given model by referring to the library selection, CLOCKS AND MORE CLOCKS by P. Hutchins.

Prerequisite Student Skills: Number recognition; count by 5's

Activities: #1.Show students a clock and discuss features : Do all clocks show the same time? #2 Field trip to various campus areas to check other clocks. #3 Read- CLOCKS AND MORE CLOCKS (P. Hutchins.

#4 Discuss /conclude -Were Mr. Higgins' clocks all correct ? Did he need to buy additional clocks? Why did he think his clocks were wrong ? Whatwas happening to the clocks as he moved from room to room? Do all clocks look the same ?

#5 Teacher will guide students using board activities. Students will use individual clocks to reconstruct times from Mr. Higgins' clocks.

#6 Computer Activity- Using acetate over the monitor, let students reconstruct times from Mr. Higgins' clocks.

#7 Extension- How many clocks did Mr. Higgins buy ? At the end of the story, how many clocks did he have ?

#8 Enrichment- Predict whether or not the clock will change when walking from the room to the cafeteria

#9 Graph predictions of whether time will or will not change . Take a walk to verify predictions.

Instructional Resource: LOGO

Computer Lesson #K-1-33

Topic: TELLING TIME

Suggested Grade Level: K-1

Mathematical Essential Element: 04 Measurement concepts and skills using metric and customary units.

Descriptor: 0403 Experience at the readiness level: identifying time units.

Objective: 040301 Tell time by the hour.

Content Description: Telling time to the hour/half hour.

Prerequisite Student Skills: EZ LOGO commands

Activities: Use prepared transparency taped to monitor.

Step 1: To represent minute hand at hour. Press F four times, press B four times.

Step 2: To represent minute hand at half hour. Press R six times, F four times and B four times.

Instructional Resource: E Z LOGO

Pre-Computer Lesson #K-1-34

Topic: ANGLES (TURNS)

Suggested Grade Level: K-1

Mathematical Essential Element: Enrichment

Descriptor: Enrichment

Objective: Enrichment

Content Description: The students will follow a maze and determine how many lines are needed to get to the finish line.

Prerequisite Student Skills: Rote counting

Activities: Step 1: Discuss the concept of turns. Have students practice making turns.

Step 2: The student will follow a maze on the floor and determine how many turns he must make to get to the finish line.

Step 3: The students will be placed at different places on the maze . They will then determine the number of turns needed in order to get to the finish line.

Step 4: The student will do a worksheet on how many turns each turtle will need to make in order to finish the race. (see back)

Instructional Resource: Addison-Wesley Mathematics

Write the number of corner turns each turtle needs to make to finish the race.

Turtle 3 ___ Turtle 2 ___ Turtle 6 ___

Turtle 7 ___ Turtle 1 ___ Turtle 4 ___

Computer Lesson #K-1- 35

Topic: ANGLES

Suggested Grade Level: K-1

Mathematical Essential Element: 1.9 (new element)

Descriptor:

Objective: Reflecting on the problem solution process and the solution of a problem by evaluating outcomes for reasonableness, making revisions as needed, describing and discussing the process and solution and making a decision based on the solution.

Content Description: Making a decision based on a solution

Prerequisite Student Skills: Follow directions

Activities :Step 1: Press 3 (Make a product)

Step 2: Easy-follow instructions

Step 3: Decide whether you need to punch, rotate, or stripe. Follow the instructions until completed then press DONE to check your work.

Step 4: Either choose to correct or go on. (See p.p. 31-42.

Instructional Resource: The Factory by Marge Kosel and Mike

Computer Lesson #K-1-36

Topic: CUBES

Suggested Grade Level: K-1

Mathematical Essential Element: 05 Properties and relationships of geometric shapes and their applications.

Descriptor: 0502 Experience at readiness level: size and shape.

Objective: 050202 Identify cubes.

Content Description: The student will be exposed to taking two flat squares and changing on the computer screen to a 3-D cube.

Prerequisite Student Skills: Knowledge of square.

Activities: The teacher will construct two squares on the screen in the following manner:

N
1 Point
Return
2 Label
4 Moveable Point
to the left 7
up 2
S and to the right 2
Return
4 Moveable Point
up 2
to the left 3
Return
4 Moveable Point
to the left 3

up 5
S and up 5
Return
4 Moveable Point
up 9
to the left 4
Return
4 Moveable Point
up 9
Return
4 Moveable Point
up 6
4 Moveable Point
up 6
to the left 4
Return
ESC
1 Draw
1 Segment
AB
Return
1 Segment
BC
Return
1 Segment
CD
Return
1 Segment
DA
Return
1 Segment
EH
Return

1 Segment

EF

Return

1 Segment

GH

Return

1 Segment

FG

Return (Two squares should be on the screen. Connect outside corners to form a cube in the following manner.

1 Segment

FD

Return

1 Segment

GC

Return

1 Segment

EA

Return

1 Segment

HB

Return

Instructional Resource: LOGO

Schwartz, Judah and Yerushalmy, Michael, (1986) The Geometric Presupposer, Education Development Center.

Computer Lesson #K-1-37

Topic: FRACTIONS (EQUAL PARTS)

Suggested Grade Level: K-1

Mathematical Essential Element: Concepts and skills associated with understanding of numbers and the place value system.

Descriptor: Recognize fractions.

Objective: The student will make a fraction kit of 1, 1/2, 1/3, 1/4. He will manipulate the fraction parts of a whole object.

Content Description: Dividing a model into equal parts (whole and 1/2).

Prerequisite Student Skills: Basic LOGO graphics commands.

Activities: Step 1- The student will construct a horizontal rectangle model on the screen.

```
TO RECT
LT 90
FD 80
RT 90
FD 50
RT 90
FD 160
RT 90
FD 50
RT 90
FD 80
END
```

Control C

RECT

Step 2- The student wil divide the model into halves.

TO HALVES

RT 90

FD 50

BK 50

END

Control C

RECT

HALVES

Instructional Resource: The Computing Teacher, Ary, June 1986. pp. 47-50

Computer Lesson #K-1-38

Topic: FRACTIONS

Suggested Grade Level: K-1

Mathematical Essential Element: Concepts and skills associated with understanding of number and the place value system.

Descriptor: Recognize fractions.

Objective: The child will make a fraction kit of 1, 1/2, 1/3, 1/4. He will manipulate the fractions parts of a whole object.

Content Description: Dividing a model into equal parts. Whole, 1/2, 1/4.

Prerequisite Student Skills: Basic LOGO graphic commands. Construction of horizontal rectangle and halves of that rectangle.

Activites:

Step1: The learner will construct horizontal rectangle.(See computer lesson on whole and 1/2 fractions.)

Step 2: The learner will construct 1/2's in the rectangle.(See computer lesson on whole and 1/2 fractions.)

Step 3: The learner will divide the model in to fourths.

```
TO FOURTHS
LT 90
FD 80
BK 40
RT 90
FD 50  BK 50
RT 90
```

```
FD 40
LT 90
FD 50  BK 50
RT 90
FD 40
LT 90
FD 50  BK 50
RT 90
FD 40
END
CONTROL C
RECT
HALVES
FOURTHS
```

Instructional Resource: LOGO

The Computing Teacher, Ary June 1986 p. 47-50

Computer Lesson #K-1-39

Topic: ORDERING

Suggested Grade Level: K-1

Mathematical Essential Element: 07 The use of probability and statistics to collect and interpret data.

Descriptor: 0702 Experience at the readiness level: ordering using objects and numbers.

Objective: 070201 Locating points on 5X5 grid.

Content Description: The student will demonstrate knowledge of straight lines by plotting dots on a grid to construct a line.

Prerequisite Student Skills: Knowledge of numbers 0-4; knowledge of straight line.

Activities: TIC TAC TOE

Step 1: Students type in names to be contestants in competition.

Step 2: Students take turns capturing points by naming ordered pairs. Children are instructed to choose a number on the bottom (x-axis) then type comma and number from the side (y-axis). Return to plot dot with the child's symbol.

Step 3: The first player to correctly plot 4 dots in a line is the winner. Bumble keeps score. At the end of time limit child with highest score is winner for the day.

Instructional Resource: LOGO

Per, Teri, Bumble Games, The Learning Company, pp. T31-T32

Computer Lesson #K-I-40

Topic: GEOMETRY POINTS AND LINE SEGMENT

Suggested Grade Level: K-1/with teacher directions

Mathematical Essential Element: Enrichment

Descriptor:

Objective: Combining shapes to form new shapes.

Content Description: Become aware of beginning mathematical terms (point and line segment).

Prerequisite Student Skills: letters, right, left, up, down

Activities:

Using the Sunburst program, the student will select points at random using the directional arrow keys. Students will connect points(using 1 segment command) to create design.

Directions: choose 1 point, a single point will be placed on screen. You can move this point to any location using the arrow keys. Once the point is placed where you want it , press RETURN and this point will be labeled A. After this is done the main menu will return to the screen. To label other points, press 2 label and then press 4 moveable points. repeat procedure for each point. Press ESC then press 1 draw. Students decide which points to connect. Next press 1segment fo each line segment until all points are connected and the design complete.

Instructional Resource: Sunburst program p. 4

Computer Lesson #K-1-41

Topic: PROBLEM SOLVING SKILLS

Suggested Grade Level: K-1

Mathematical Essential Element: 06 The representation of numbers on a line and pairs of numbers.

Descriptor: 0601 Experience at the readiness level: ordering points on a line.

Objective: 060101 Show positional relationships by indicating the specified pairs of numbers.

Content Description: 5X5 grid of intersecting lines

Prerequisite Student Skills: bottom, side, up, down, right, left

Activities: A VISIT FROM SPACE

This game introduces a 5X5 grid of intersecting lines. Students hunt for the spaceship of Bumble's cousin, which is hidden at an intersection of two lines. Both the x and y coordinates are identified by numbers, which prepares students for plotting points on grids. Students are prompted to enter the x-axis coordinate first, then the y-axis coordinate.

DIRECTIONS: Type a number at the bottom of the TV screen.
Then type a number at the side of the screen.

Instructional Resource: LOGO

The Learning Company, Bumble Games, p. T28